A-dec 511 Chair

The A-dec 511 chair is designed to provide a range of movements to position the patient for dental treatment. The dental chair consists of a stable base, an ergonomically synchronized seat and back support, adjustable head support, and collapsible arm support. The chair movement is controlled through the use of a footswitch and/or touchpad(s). Entry, treatment, and exit positioning of the chair is delivered through the use of a hydraulic system and four programmable positions. The deluxe touchpad option provides two operators with four more potentially programmable positions for a total of eight.

This section provides information related to servicing, maintenance, and adjustments. Detail on how to service the chair and troubleshoot specific problems is presented. For information on service parts, see the *Genuine A-dec Service Parts Catalog* or contact A-dec customer service.

Chair Specifications

Chair Capacity:

Patient Load: 300 lb (135 kg) maximum

Accessory Load: 250 lb (113 kg) maximum

Specifications are subject to change without notice.

NOTE: Ensure the chair is bolted to the floor after installation.

Power On/Off Button

The power On/Off button is located on the base of the chair, and is the main disconnect that completely shuts down the dental unit. When the button is pressed in, power is on. When the button is out, power is off.

Limp-Along Feature

If there is an electronic feature problem or malfunction, the limp-along feature allows the operator to move the chair in the up direction, for one second intervals by pushing the manual control buttons on the touchpad or footswitch. This feature is enabled when there is a problem with the automatic position sensing system and allows the operator to position the chair.

How to Remove/Install Chair Covers

The A-dec 511 chair motor pump, lift arm, and stop plate covers should be removed in the following order.

Motor Pump Cover

Remove - Remove screw from each side and lift up.

Install - Replace cover, and attach with two screws.

Lift Arm Cover

Remove - Pull one side of the cover until it releases from the lift arm.

Install - Align one side of the cover with the lift arm and snap into place. Ensure both sides are firmly attached.

Stop Plate

Remove - Pull one side of the cover until it releases from the lift arm.

Install - Slide one side of the cover over the post on the lift arm and attach.

Swivel Cover

Remove - Pull one side of the cover and pull off.

Install - Align the cover with the holes on one side and snap cover into place by applying pressure to the center of the cover.

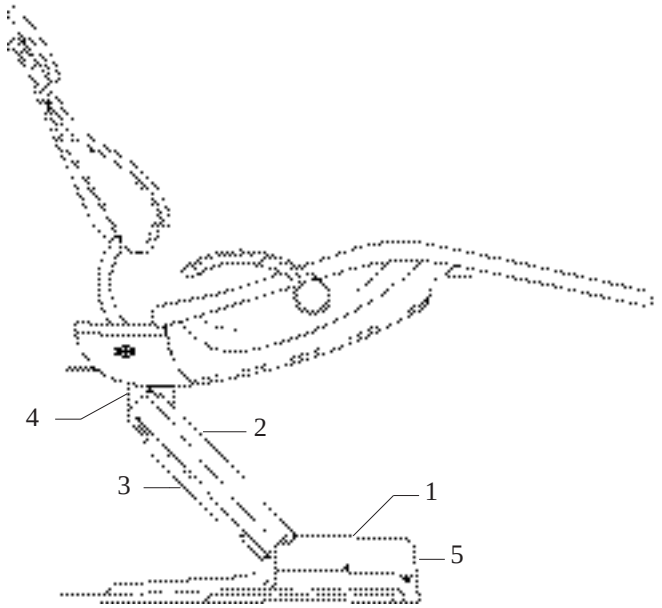
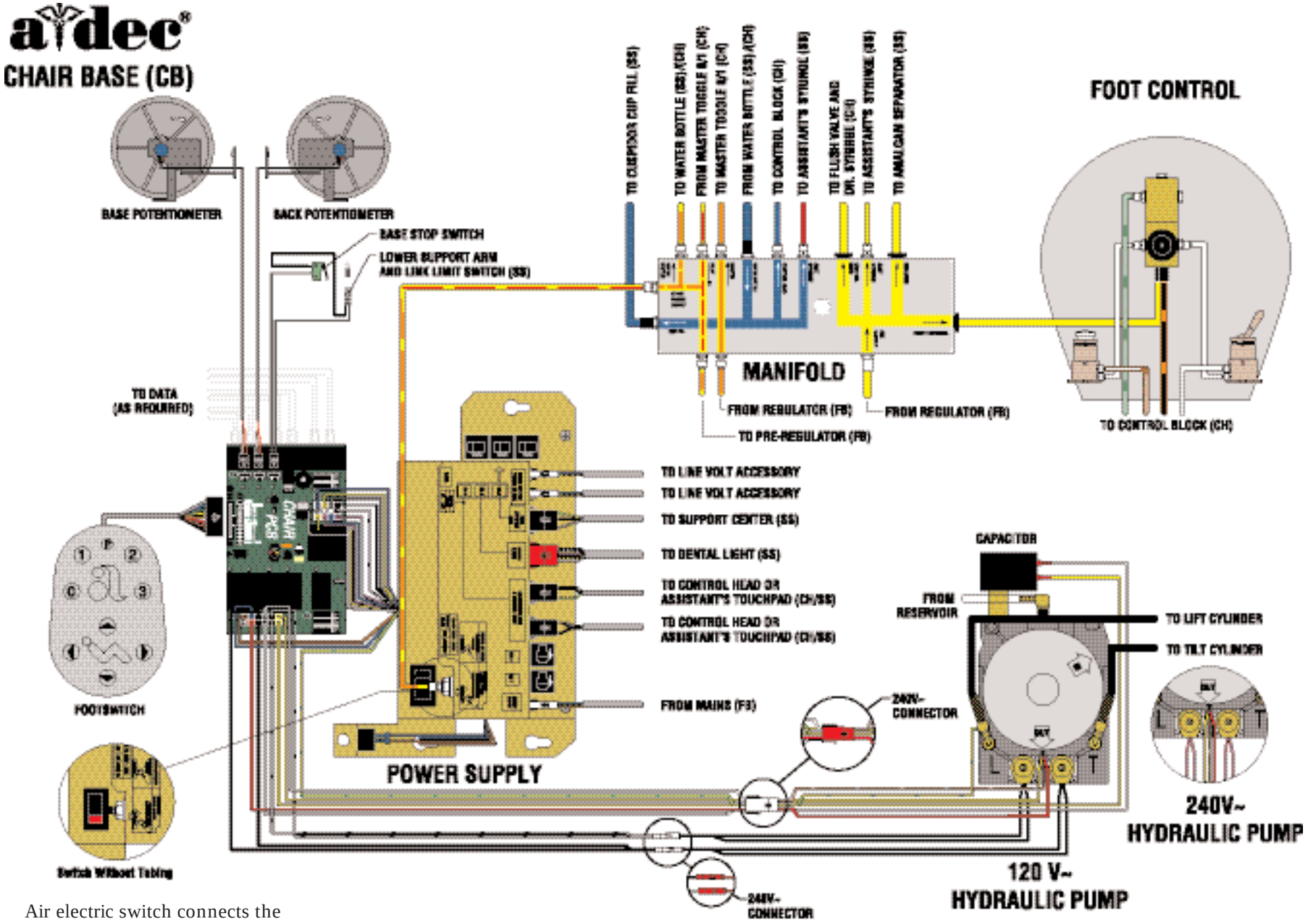


Figure 13. A-dec 511 chair covers.

Item #	Part Number	Description
1	62.0080.00	Motor pump cover
2	62.0081.00	Lift arm cover
3	62.0084.00	Stop plate cover
4	62.0122.00	Swivel cover
5	62.0101.00	Motor pump cover plug

Chair Flow Diagram

This flow diagram details both electrical and plumbing information for servicing and troubleshooting the A-dec 511 chair. It is located on the motor pump cover. This diagram includes the air electric switch, motor pump connections, and potentiometers.



Air electric switch connects the power supply to pilot air.

How to Identify the Chair Circuit Board Components (P/N 90.1072.00)

The chair circuit board contains the relays necessary for controlling the chair's motor pump and solenoids. The chair circuit board is equipped with test points that allow manual chair operation without a footswitch or a touchpad.

The chair circuit board is located on the power supply. To access the circuit board, remove the pump cover. Use the LEDs located on the circuit board to determine if the chair is functioning correctly.

Item #	Description
1	**P7**, **P8**, **P9** - Data line ports
2	**DS4** - Stop switch LED (limit switch) and P10 connector
3	**DS5** - Back potentiometer LED and P1 connector
4	**DS6** - Base potentiometer LED and P2 connector
5	**P5** - Footswitch connector
6	**P3** - Test points
7	**DS12** - Base down LED and relay
8	**DS11** - Base up LED and relay
9	**DS10** - Back down LED and relay
10	**DS9** - Back up LED and relay
11	**DS1** - AC power LED
12	**DS2** - Status LED
13	**DS3** - Data LED
14	**DS13** - Chair lockout LED and terminal strip J1
15	**J2** - Ø VAC terminal strip (output)
16	**J2** - 24 VAC terminal strip (output)
17	**P4** - Input power and dental light connector
18	**J3** - Vacuum relay output terminal strip
19	**P11** - Pump motor and solenoid connector
20	**DS8** - Dental light relay
21	**DS7** - Dental light relay

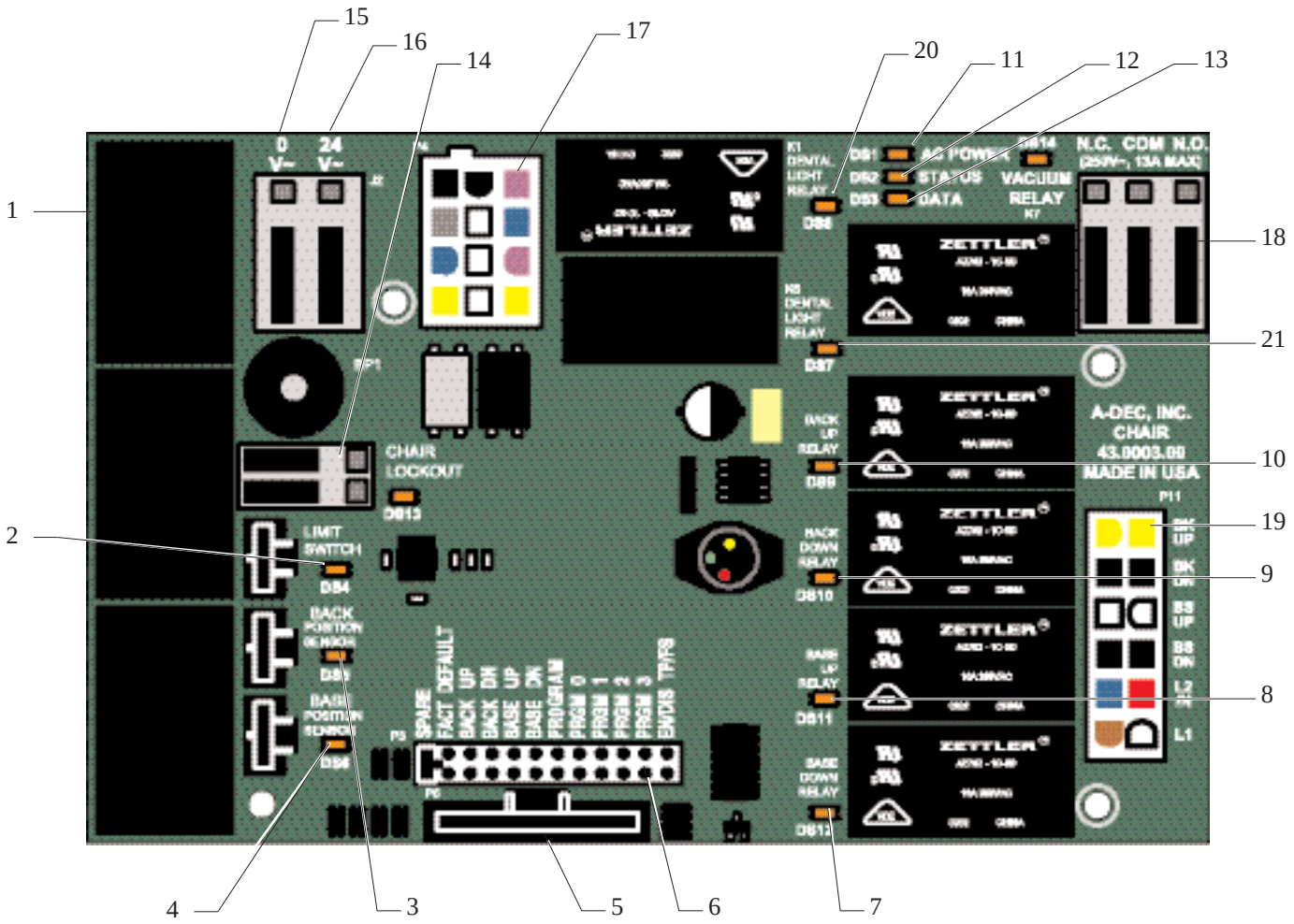


Figure 14. A-dec 511 chair circuit board components.

Factory Default Routine

When a new circuit board is installed in the chair, the circuit board needs to run the factory default routine to learn the range of motion of the chair. The routine sets the base and back upper limits, calculates new presets based on actual range of motion of the chair, and verifies that the potentiometers work.

To start the factory default routine, place the "spare" jumper in the factory default position on the P3 test points of the chair circuit board.

When running the factory default routine the chair:

- Moves base down
- Moves base up
- Moves back down
- Moves back up
- Moves base and back to Position 0, and
- Beeps three times.

NOTE: The jumper must remain in the factory default position to complete the factory default routine. The status LEDs on the standard and deluxe touchpads and the chair circuit board double blink while the factory default routine is running and after the routine is complete.

LED Identification

LED	Status	Description
DS1 - AC power LED	Off Green, steady	No 24 VAC power, tripped circuit breaker, power supply turned off, no line voltage 24 VAC at the terminal strip
DS2 - Status LED	Off Green, steady	System is not functioning, no power or circuit board has failed Normal operation
DS3 - Data LED	Off Green, steady Green, blinking	No DCS communication, not connected to the DCS, or DCS has failed Detects active DCS Valid DCS message
DS4 - Chair limit switch	Off Red	Closed, (normal) Open, (activate)
DS13 - Chair lockout	Off Red	Open, (normal) Closed, (activate)
DS5 + **DS6** - Chair potentiometers	Off	Potentiometer: • Not connected or bad connection • Moving in wrong direction • Limited range of motion, or • Cable is not on wheel.
	Yellow, steady	Normal operation
	Yellow, fast blink	Upper end of travel
DS9, **DS10**, **DS11**, **DS12** - Chair relay LEDs	Off On	Relay is off Relay is on
DS7, **DS8** - Dental light relay LEDs	Off On	Relay is off Relay is on
DS14 - Vacuum relay LED	Off On	Relay is off Relay is on

Chair Power Supply

The 300-watt power supply comes standard with the A-dec 511 chair. It is located in the motor pump area of the chair. The total available auxiliary load is a maximum of 4 Amps.

Circuit Breaker	Function
CB 1	Mains
CB 2	Mains
CB 3	Support side arm (side support arm)
CB 4	Dental light
CB 5	Assistant's arm, control head (delivery system), and chair circuit board

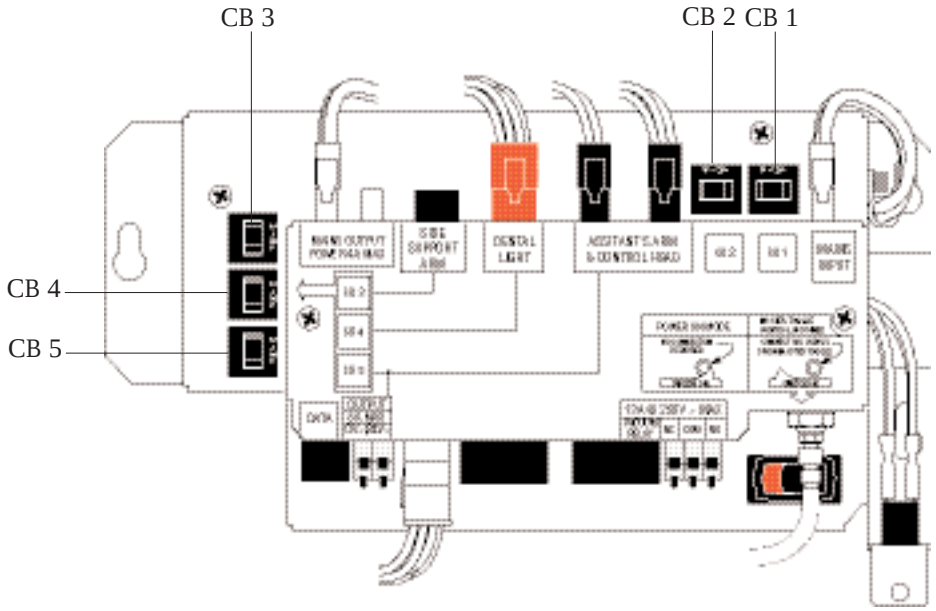


Figure 15. Chair power supply circuit breaker identification

How the Hydraulic System Operates

The hydraulic system deactivates automatically at the upper and lower extremes of travel. The system is leak-free during transportation, storage, and operation. The hydraulic system consists of:

- Hydraulic fluid reservoir
- Hydraulic cylinders
- Motor-driven hydraulic pump with solenoids

Hydraulic Fluid Reservoir

The hydraulic fluid reservoir is located in the lift arm of the chair under the stop plate cover. The fluid level in the reservoir can be seen through the sides of the reservoir and is serviced via a top fill cap. The hydraulic system holds 40 ounces (2.5 pints [1.18 l]) of hydraulic fluid.

- Place the chair in the full base and back up position, when filling the reservoir.
- The reservoir should be filled to the green Max line. Do not over fill. Cycle the chair after the reservoir is filled.

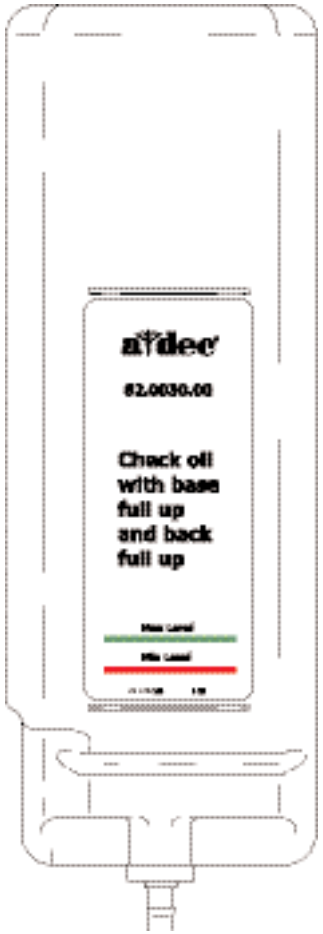


Figure 16. Identifying the hydraulic fluid reservoir fluid levels.

Hydraulic Cylinders

The hydraulic cylinders operate during the **Base Up** and **Back Up** functions. Springs and gravity retract the piston during base and **Back Down** functions.

The chair seat travels vertically from a low point of 13.5" (343 mm) to a high point of 31.5" (800 mm) above the floor.

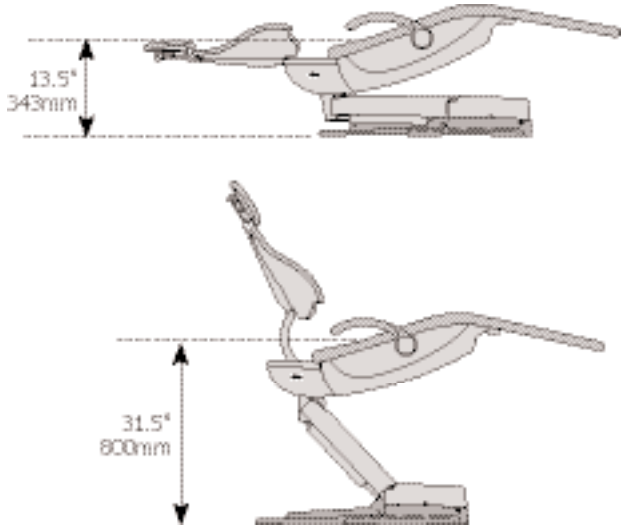


Figure 17. Hydraulic cylinder operation.

Motor-driven Hydraulic Pump

The hydraulic pump takes hydraulic fluid from the reservoir and pressurizes it to extend the chair lift and tilt hydraulic cylinders for back and base up functions. The bi-directional pump rotates one direction for **Base Up** and one direction for **Back Up**. The solenoids mounted to the pump assembly gate hydraulic fluid from the two cylinders. Depending on the chair function, the controller selects which solenoid-actuated manifold valves are opened or closed. The 100-120 VAC pump and 220-240 VAC pump are equipped with an automatic reset 110°C (230°F) thermostat. There are no serviceable parts on the hydraulic pump other than the solenoids.

NOTE: The speed of the chair is not adjustable.

Capacitor
100 VAC (P/N 041.642.00)
110 - 120 VAC (P/N 041.643.00)
220 - 240 VAC (P/N 041.644.00)

The capacitor is energized during chair **Base Up** or **Back Up** functions.

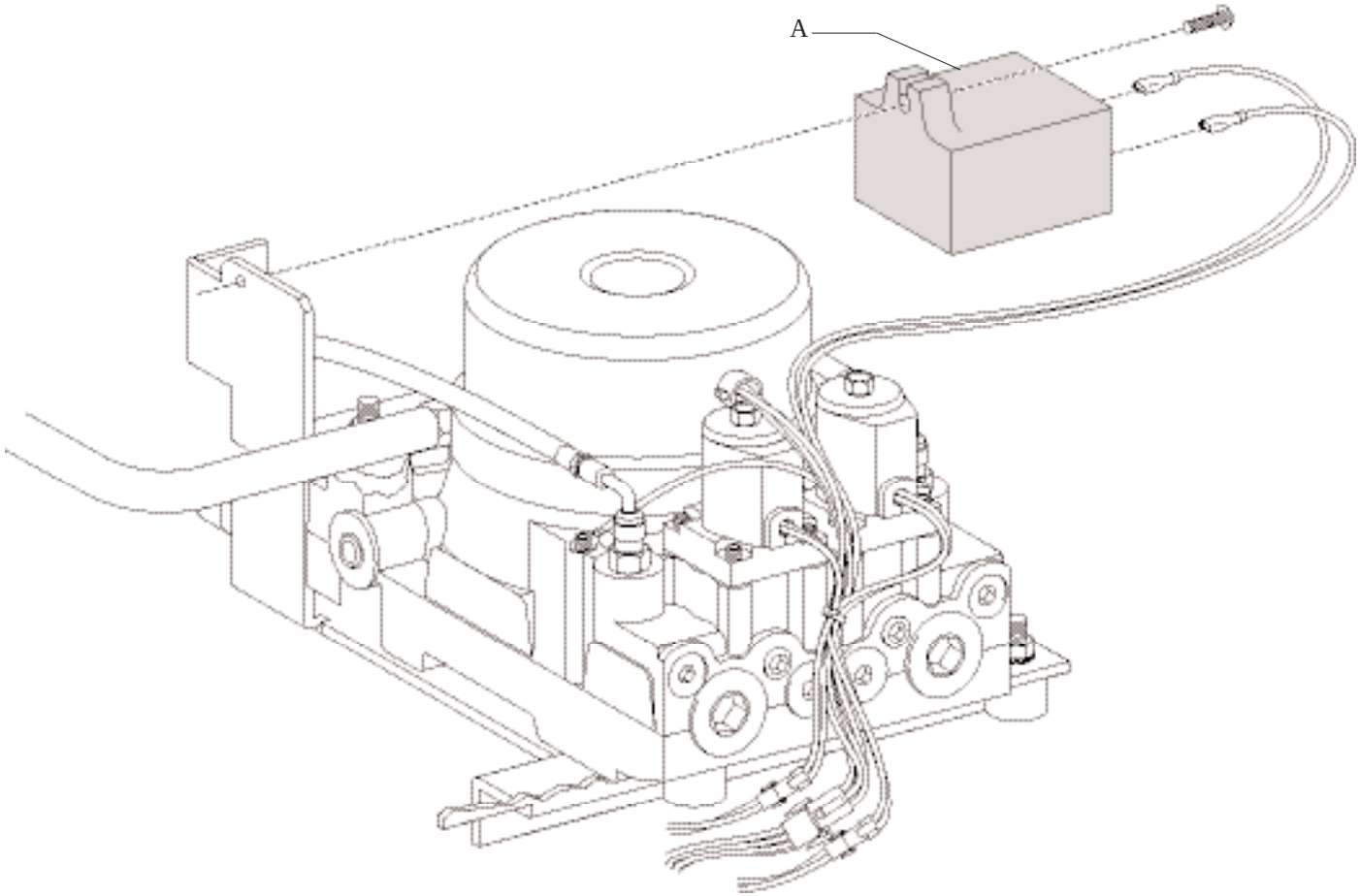


Figure 18. A-dec 511 chair capacitor located on the motor pump assembly. (A) capacitor

Solenoids
100 - 120 VAC (P/N 90.1070.00)
220 - 240 VAC (P/N 90.1071.00)

The two chair solenoids, one for each cylinder, control the down functions of the chair. The solenoid (A) controls the base down function and the solenoid (B) controls the back down function. The base and back down solenoids are interchangeable, and available in two voltage ranges.

How to Test Solenoids

To check for a failed solenoid, test the solenoids using a volt/ohm meter or magnetic pull test.

- Magnetic pull - Hold a paper clip loosely in your hand and activate the solenoid by pressing **Base Down** or **Back Down** on the footswitch or touchpad. If there is a pull, the solenoid is being activated.
- Coil resistance - Disconnect the solenoid power at the 2-position connector. Place on Ohm meter probe on each of the solenoid connector terminals.
  100 - 120 VAC = 177 Ohms ± 18 Ohms
  220 - 240 VAC = 845 Ohms ± 85 Ohms

NOTE: If the solenoid is hot, then the resistance will read higher.

ELECTRICAL WARNING: The solenoid coils are powered by line voltage (100, 120, or 240 VAC). Failure to unplug the chair may result in serious injury from electrical shock.

WARNING: The base or back system must be depressurized prior to removing the solenoid. To depressurize base or back system, remove the failed solenoid coil and replace with the operating solenoid coil. Lower the chair base and back.

NOTE: When replacing a solenoid, wipe up any oil, and replace existing O-rings on the solenoid base.

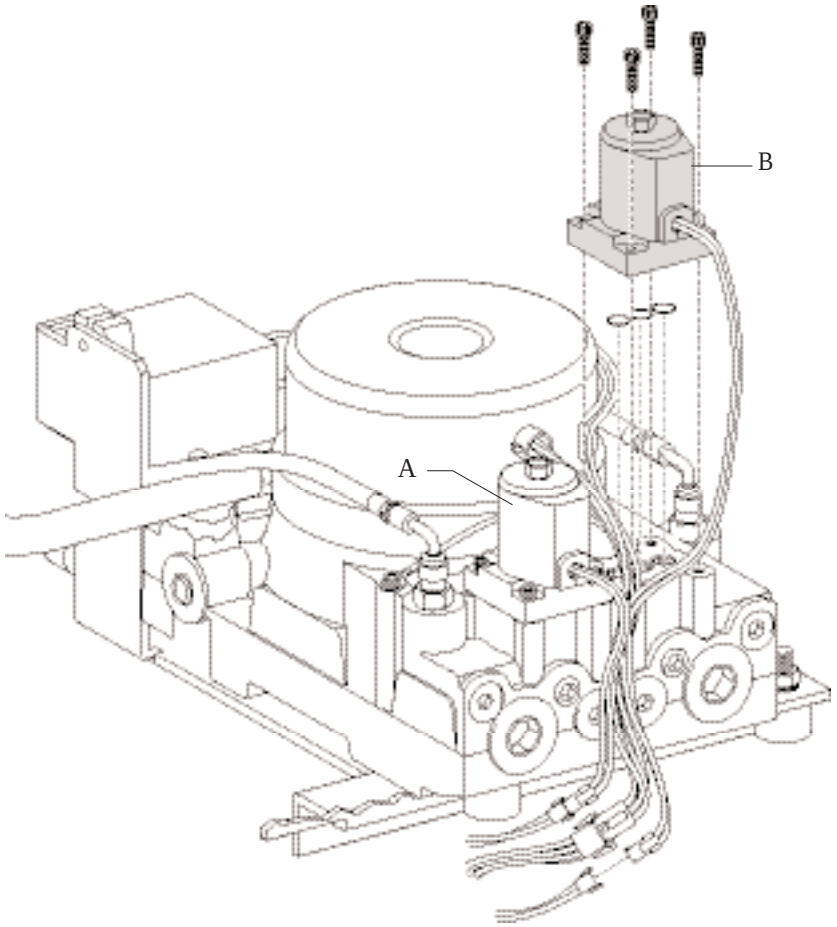


Figure 19. A-dec 511 chair solenoids located in the motor pump assembly. (A) base down solenoid; (B) back down solenoid

How the Potentiometer Operates

The potentiometer and cable assembly is a simple, accurate unit, which eliminates position float. "Float" is seen as a slight change or variation in the pre-programmed positions. The same potentiometer assembly is used for both lift and tilt requirements. If a potentiometer should fail, the limp-along feature allows the operator to position the chair for one second intervals by pushing the manual control buttons on the touchpad or footswitch.

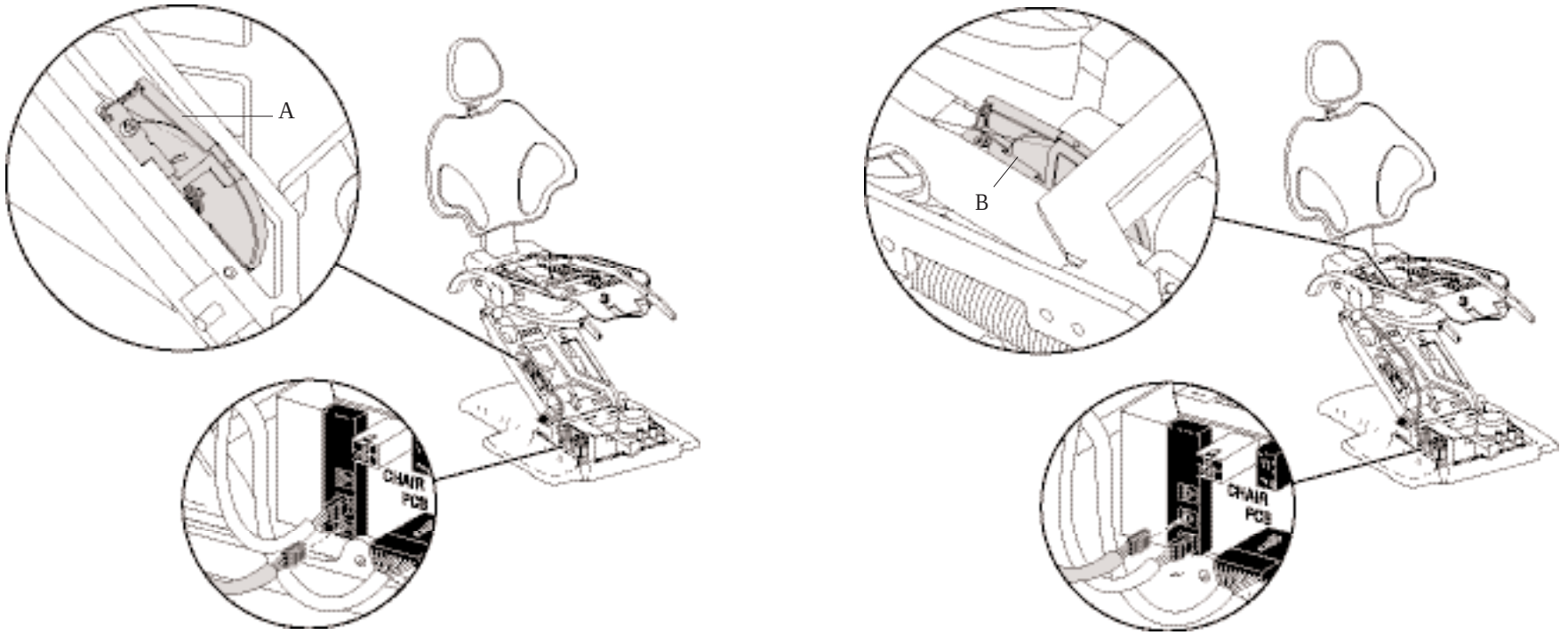


Figure 20. Location of the chair **Base Up** and **Back Up** potentiometers. (A) Base Up potentiometer; (B) Back Up potentiometer

How the Chair Stop Plate Operates (P/N 90.1095.00)

The chair stop switch stops chair movement when the stop plate is pressed. Should anything inadvertently become lodged under the chair, press **Base Up** on the touchpad or footswitch to raise the chair so the object can be removed. As long as pressure is applied to the stop plate, the chair will not move down.

The stop plate has only one switch. The switch and all other parts snap into place for easy removal or replacement. No tools are required.

Be sure to power off the chair and disconnect it from its power source before replacing the stop switch. Cable tie the wires to the lift arm to prevent kinking and pinching.

Chair Bump-Up Feature

The chair stop plate and the assistant's arm, trigger the chair to move upwards if it was moving down when the stop plate switch was activated.

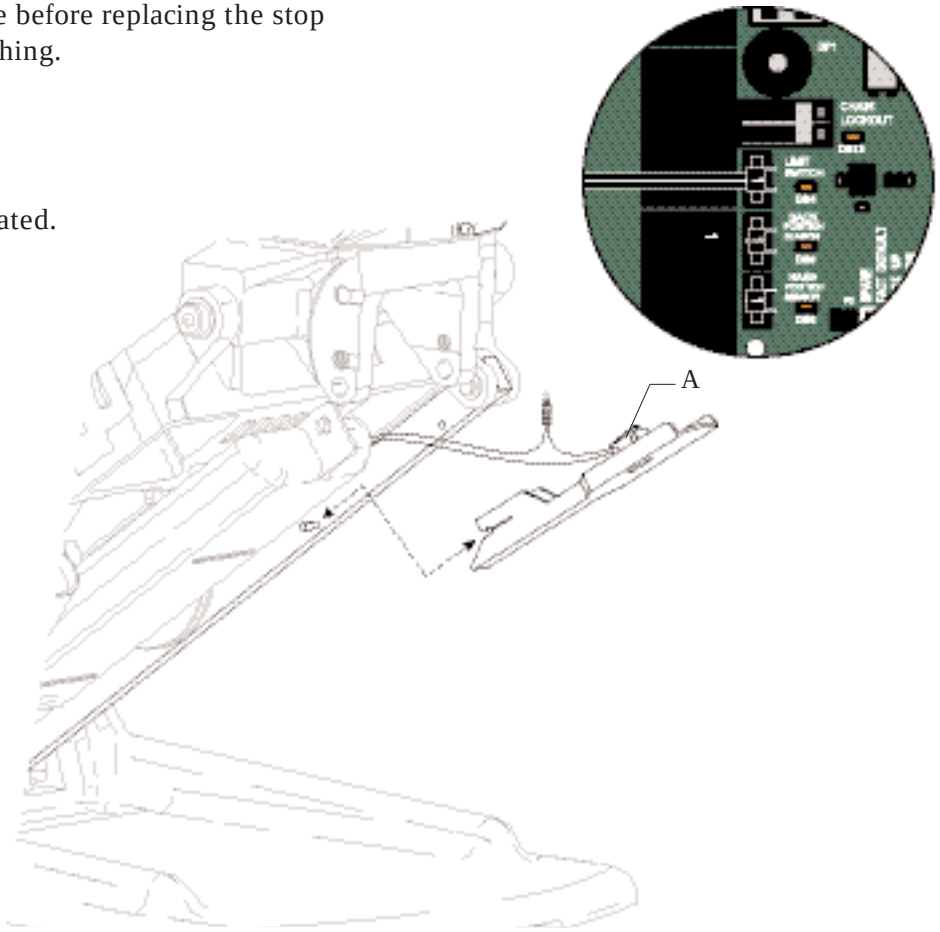


Figure 21. A-dec 511 chair stop plate. (A) stop switch

How to Adjust the Chair

Swivel Brake

The chair can rotate to any position within 30° either side of center. The chair swivel brake restricts rotation of the chair to keep the chair from moving. To engage the brake, push the brake lever firmly to the left. To release the swivel brake, push the brake lever to the right.

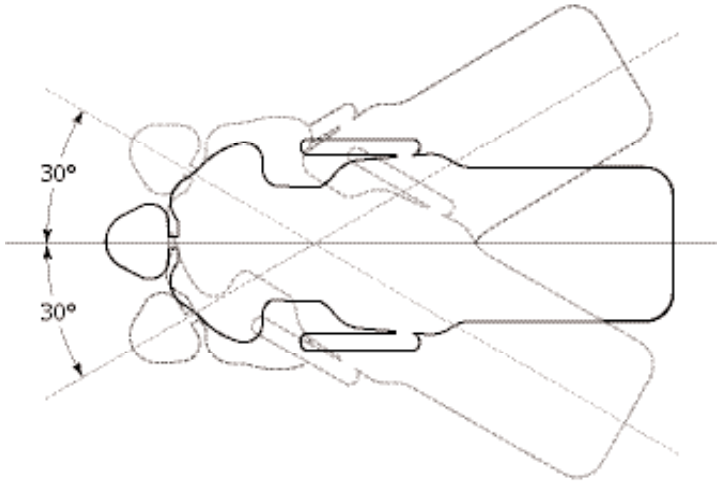


Figure 22. Chair swivel.

Tension Adjustment

If the chair swivels left or right with the brake engaged, or if it is difficult to move with the brake disengaged, adjust the swivel brake tension. To adjust the tension, use a hex key and turn the tension adjustment screw clockwise to increase brake friction or counterclockwise to decrease brake friction.

If proper adjustment cannot be obtained through rotation of the hex key, replace the brass brake pad by removing the brake handle and using a hex key to disengage the pad. Remove the old pad and replace with new one. Replace the brake handle and handle retainer.

NOTE: The shipping pin can be reinstalled in the chair if swivel feature is not desired.

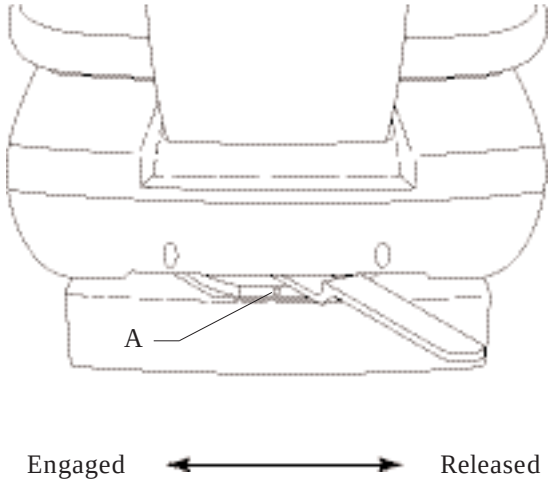


Figure 23. Swivel brake tension adjustment. (A) tension adjustment screw

Headrest

The headrest adjustment lever allows the headrest to be adjusted using one hand. When the lever is released, the headrest holds its position.

Drift Adjustment

If the headrest drifts downward, or if it is difficult to move up or down, the glide bar tension needs to be adjusted. To adjust the tension, use a hex key and turn the tension adjustment screw clockwise to increase friction or counterclockwise to decrease friction.

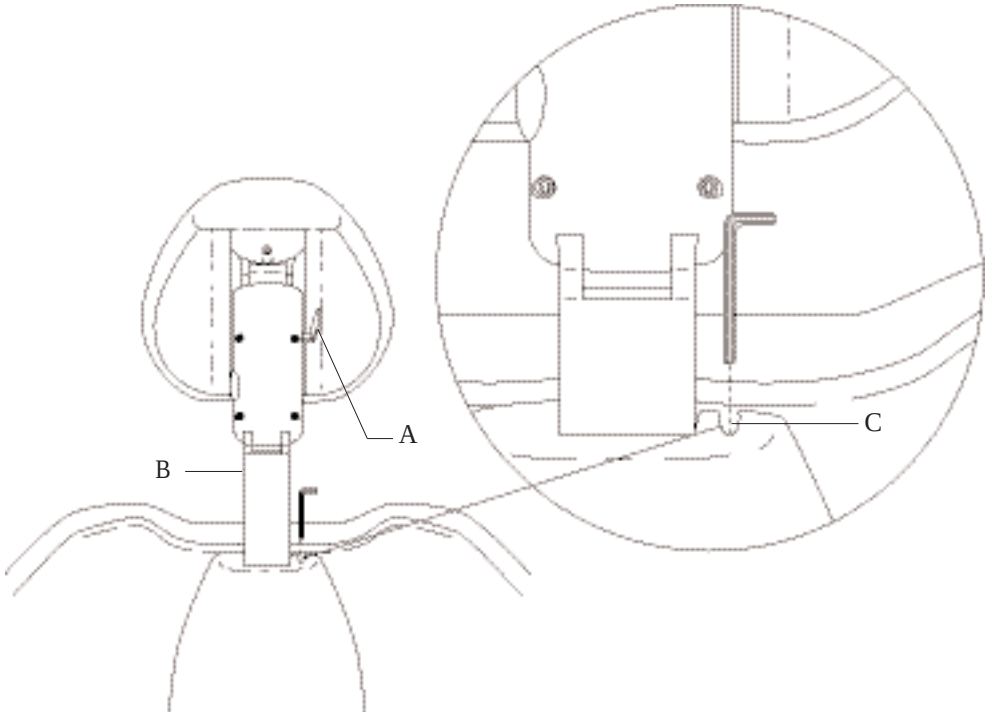


Figure 24. Headrest adjustments. (A) headrest adjustment lever; (B) glide bar; (C) glide bar tension adjustment

How to Troubleshoot the Chair

Tips and troubleshooting information are listed in the table to assist in diagnosing chair problems. These tables are not intended to cover every situation, but do include the most common problems that may be encountered.

Problem	Possible Cause	Action
No power to chair or unit, office still has power	The chair is unplugged	Plug chair in to power source.
	The power button is in Off position	Press in power button.
	No pilot air to power supply	Verify master On/Off toggle is in the On position. Verify pilot air is connected to the power supply and air manual shutoff valve is fully open.
	Power supply circuit breaker is tripped or power supply has failed	Check circuit breaker and reset. If the circuit breaker trips again, disconnect all power cables from the power supply then reconnect one at a time observing which one causes the circuit breaker to trip – that will identify the problem circuit.
	Circuit board has failed	Check chair circuit board power LED. If not illuminated, check connections and replace circuit board, if needed.
No base and back up function, the motor relay clicks and LED illuminates	Capacitor is disconnected or has failed	Verify the base up or back up relay clicks and the LED (**DS10** or **DS12**) on the chair circuit board is illuminated. Check capacitor connections. Replace the capacitor with one of correct voltage.
No base or back down, relay clicks and LED illuminates	Solenoid has failed	• Check for magnetic pull while operating base or back down function. • Check for correct resistance value at solenoid connector: 100 - 120 VAC 177 Ohms ± 18 Ohms 220 - 240 VAC 845 Ohms ± 85 Ohms • Replace solenoid. **WARNING**: Depressurize system before replacing the failed solenoid. To operate chair to full **Base Down** and **Back Down**, switch the good solenoid coil for the failed one and operate the function until full down position is reached.
Back down is pressed, base moves or base down is pressed, back moves	The base and back solenoid connectors are switched	Connect the solenoids correctly.
Base or back moves up for only one second, no automatic buttons work (limp-along feature) **DS5** - (back) not illuminated **DS6** - (base) not illuminated	The potentiometer for that movement has failed, is disconnected, or is not turning	Check sensor electrical connections, wiring and the pull cable. Replace as an assembly if damaged.

Problem	Possible Cause	Action
Base Down and programmed positions do not work, but the chair back functions, A-dec status icon is flashing, **DS4** red LED on the chair circuit board is illuminated	Stop switch for chair, or support side arm is activated or has failed	Check for obstruction under chair, or support side arm and remove. • Disconnect the chair stop switch connector at the chair circuit board and insert the jumper. If the red LED **(DS4)** goes out and the chair works, then the chair circuit board is functioning normally. • Remove the spare jumper from the chair circuit board, and reconnect the chair stop switch connector. Disconnect the support side stop switch wiring from the chair stop switch connector and insert the jumper. If the red LED **(DS4)** goes out and the chair works, replace the side support stop switch. If the red LED **(DS4)** stays on, then replace and/or repair the chair stop switch assembly.
No chair movement from a touchpad, status icon is illuminated	Touchpad DCS is interrupted	Verify the chair operates with the footswitch or the test points on the chair circuit board. Then check the data line connection, and if needed, replace the data line connected to the touchpad. Verify the data light illuminates.
No chair movement from the touchpad, status icon is not illuminated	Faulty touchpad	Verify AC power to chair and that chair can be operated from the footswitch or other touchpad. Verify 24 VAC to touchpad circuit board. If 24 VACs present, replace the touchpad.
	Faulty touchpad power cable	Verify the AC power LED **(DS1)** is illuminated on the delivery system circuit board or chair circuit board. Verify the touchpad functions normally by using an external touchpad power cable. Replace the touchpad power cable, if needed.
Base or back will not move to full up position, LED for that function is flashing	Potentiometer connections are switched	Connect potentiometers to correct chair circuit board locations. **P1** — Back potentiometer **P2** — Base potentiometer
Unable to change chair programmed positions	Potentiometer connections are switched	Connect potentiometers to correct board locations. **P1** — Back potentiometer **P2** — Base potentiometer
	The potentiometer for that movement has failed, is disconnected, or is not turning	Check sensor electrical connections, wiring, and the pull cable. Replace as an assembly if damaged.

Problem	Possible Cause	Action
The three tap feature used at installation no longer works	The three tap feature is disabled	The three tap feature is disabled when a powered touchpad has been connected to the DCS, a footswitch is installed or the test points have been used to move the chair. To re-enable the three tap feature: • Disconnect the DCS touchpad connections • Disconnect the footswitch • Cycle power to the chair
No or limited chair functions from footswitch	Footswitch connector/wiring is damaged	Check that chair operates from a touchpad or the test points **(P3)**. Replace the footswitch connector and/or wiring assembly.
	Footswitch membrane is damaged	Check footswitch connectors and membrane, replace as necessary.
The chair makes a noise when **Base Up** or **Back Up** is pressed	Chair is low on hydraulic fluid	Remove motor pump, lift arm, and stop plate covers. Check fluid level with chair base and back up by viewing the reservoir from the back of the chair. Add fluid to maximum level.
	Hydraulic hose from reservoir to pump is pinched	Inspect all hydraulic hoses, ensure they are not being pinched in any position. If the supply tube between the pump and the reservoir is kinked, order and install kit P/N 90.1100.00.
	Motor pump has as obstruction or is damaged	If chair continues to growl, lower base and add up to 4 oz (.12 l) more fluid. If noise continues, replace motor assembly.
A button on a touchpad does not work, but function works from other location(s)	Faulty touchpad	Verify the touchpad circuit board is snapped into the plastic cover. Verify the function does work from other locations (footswitch, chair test points, light switches, cuspidor buttons), then replace the touchpad.
The automatic positions do not work, the A-dec logo is flashing, double blinks	The jumper is in the factory default position on the chair circuit board test points **(P3)**	Move the jumper from the factory default position to the "spare" position on the test points.
The chair will not move up from the full base down with the foot control under the stop plate	The automatic chair lockout feature has been activated by an air signal from the foot control	Remove the motor pump cover and disconnect the delivery system data line. Turn the chair power OFF and then ON again. The chair circuit board test points or footswitch can now be used to raise the chair and remove the foot control from under the lift arm.

ELECTRICAL WARNING: The solenoid coils are powered by line voltage (100, 100 - 120, or 220 - 240 VAC). Failure to unplug the chair may result in serious injury from electrical shock.

WARNING: The hydraulic system must be depressurized before removing the solenoid. To depressurize the hydraulic system, remove the failed solenoid coil and replace with the operating solenoid coil. Lower the chair base and back.

NOTE: When replacing a solenoid, wipe up any oil, and replace existing O-rings on the solenoid base.

Problem	Possible Cause	Action
Chair brake does not hold	Brake needs adjusting or the pad needs replacing	Adjust or replace brake components as necessary.
Chair glide bar slides down or is difficult to lift up	Glide bar needs adjusting or the wear pads needs replacing	Adjust or replace glide bar components as necessary.
Headrest will not lock or is difficult to unlock	Headrest needs adjustment or needs replacing	Operating lever may be too tight, adjust for slight play in movement. If the headrest still does not work correctly, replace it as an assembly. No field service to locking components.
Armrest(s) will not lock in up position or are difficult to operate	Armrests may have an obstruction or be damaged	Check for obstruction or damage. Replace as an assembly.
Circuit breaker 1 or 2 opens	Electrical short in a module	Remove all connections from the power supply. Reset the circuit breaker. Reconnect modules one at a time until the circuit breaker trips. Review troubleshooting for that module.
Circuit breaker will not reset	Faulty circuit breaker	Replace the power supply.